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PHYTOCHEMICAL INVESTIGATIONS IN SOUTH INDIAN SPECIES OF *IPOMOEA* LINN.

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Biochemical parameters such as presence of alkaloid and quantity of protein and carbohydrate act as remarkable markers for identification of genera and species. In the present investigation phytochemical features such as quantity of protein, carbohydrates and qualitative characterization of ergoline alkaloid derivatives such as D- lysergic acid diethyl amide and elymoclavine by thin layer chromatography have been carried out for 16 South Indian species of *Ipomoea*. It is borne out that majority of the species studied have high amount of protein, carbohydrate and presence of ergoline derivatives such as elymoclavine and D- lysergic acid diethyl amide.

Key words: D- lysergic acid diethyl amide, Elymoclavine, Ergoline, *Ipomoea*, TLC

Ayurveda has identified many medicinal properties in *Ipomoea* species and it is effectively used against nosebleed and high blood pressure (Duke and Ayensu 1985, Perry 1980). *I. hederacea* seeds contain 15% crude resinous matter, a fixed oil, small amounts of saponin, mucilage and tannin. It has nauseating acid taste and disagreeable odour, dried seeds are used as purgative and the extract of the seeds are used as medicine. The antimicrobial activity of the leaf extracts of the plant, *I. kentrochulos* were tested on several pathogenic microorganisms such as S*taphylococcus* sps, *Pseudomonas* sps, *Bacillus* sps and, the fungal strains such as *Aspergillus flavus, Geotrichum, Rhizopus, Fusarium* sps. and *Candida albicans* (Vimala *et al*. 2007).

The extract of *I. obscura* were screened for their *in vitro* antioxidant activity using DPPH (2-diphenyl-1-picryhydrazyl), ABTS (2,2-Azino-bis-3-ethylbenzothiazoline-6- Sulfonic acid), hydrogenperoxide, nitric acid, sulphur oxide and hydroxyl radicals by P-nitroso dimethyl aniline (P-NDA) and deoxyribose assays. Opercutinin acid and pentasaccharide was identified in *I. stans* (Pereda Miranda, 2006). The tuberous root of the plant *I. batatas* is used as refrigerant, laxative, aphrodisiac, diuretic and tonic and are useful in burning sensation, hyperdipsia, constipation, stranguary, diabetes and general weakness. The roots of the species of *I. digitata* contains a resin similar to Jalap resin, and is considered as tonic, alternative aphrodisiac, demulcent, lactogogue and cholagogue and also used in fever and bronchitis. The leaves and roots of the *I. pes-caprae* sub sp. *brasiliensis* is used as astringent, alternative tonic, diuretic, laxative for treating stomachache, skin disease, gonorrhea and rheumatism.

I. paniculata roots are sweet, sour, acrid, astringent, cooling, diuretic, stimulant, carminative and tonic. They are useful in vitiated condition of pitta, vata, agalactia, emancipation in children, skin disease, bronchitis, fever, burning sensation etc. The whole plant of *I. maxima* is used for medicinal treatment. For many years, scientists have known of a series of hallucinogenic alkaloids in such unrelated plants such as cactus, mushrooms and morning glories. There is evidence that some groups of Indians have used several of these plants for ceremonial purposes for centuries (Mac Dougall 1960, Schultes and Wasson 1963). MacDougall believes that tribes of Indians used the morning glory in religious ceremonies and as a type of narcotic or analgesic. In the early 1570's, the King of Spain's personal physician, Hernandez, wrote that the Aztecs used morning glory seeds, called *Ololiuqi*, to commune with their God (Hofmann 1968).

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alkaloid and quantity of protein and carbohydrate acts as marker for identification of genera and species. Presence of a specific alkaloid may also be very helpful for biosystematics. In the present investigation biochemical characters such as quantity of protein, carbohydrate, and estimation of ergoline alkaloids derivatives such as D-lysergic acid diethyl amide and elymoclavine like characters, were selected.

MATERIALS AND METHODS

Protein content was estimated using Lowry's method (Lowry *et al*. 1951). 100 mg fresh samples were homogenized using 15 ml of 80 % chilled acetone to remove chlorophyll. The chlorophyll free extract was again homogenised with 5 ml of phosphate buffer (pH 7). The homogenates were centrifuged at 10,000 rpm for 10 min and the supernatant was collected for protein estimation. For carbohydrate estimation Anthrone method was adopted, fresh samples of 100 mg were weighed out and hydrolyzed using 2.5 N HCl in a boiling water bath for 3 hours. The volume was made up to 100 ml and centrifuged. 0.1, 0.2, 0.6 and 0.8 ml aliquots were used for analysis. The volume was made to one ml by the addition of double distilled water and added 4 ml of anthrone reagent. The solution was boiled for 8 minutes in a water bath and cooled rapidly. The intensity of green colour developed was recorded at 630 nm in a spectrophotometer. The amount of carbohydrate present in the sample was calculated from standard graph.

Qualitative characterization of ergoline alkaloid derivatives such as D- lysergic acid diethyl amide and elymoclavine was carried by thin layer chromatography. The sample loaded TLC plates were placed in a solvent system developed in 5:5:1 mixture of acetone: ethyl acetate:dimethyl formamide. The TLC plates were sprayed with $KMnO_4$, the Rf values crude extract were compared with the Rf values of the ergoline standards (Aldrich Co.).

RESULTS AND DISCUSSION

In the present study, an edible species *I. batatas* was found to be rich in protein content and in the case of an aquatic species, *I. aquatica* the amount of protein was also higher. The protein values in the case of dry land species like *I. carnea* sub sp. *fistulosa, I. hederifolia* and *I. horsfalliae* also have close similarity. Two climbing species *I. digitata* and *I. hederacea* also have abundant protein content. In the case of amount of carbohydrate is concerned, *I. batatas* have moderate amount. Most of the species the content ranges from 0.60 to 0.70 mg. There was a close similarity of the amount of carbohydrate in the case of terrestrial species like *I. staphylina*, *I. cairica*, *I. indica*, *I. hederacea* and *I. carnea* sub sp. *fistulosa* .

Among the 16 species selected for qualitative phytochemical analysis of ergoline derivatives, except two creepers such as *I. coptica* and *I. horsfalliiae* have D- Lysergic acid diethyl amide, three erect plants *I. carnea* sub sp. *fistulosa, I. pes- caprae* sub sp. *brasiliensis* and *I. staphylina* have same Rf value. In the case wetland species *I. aquatica* and an edible species *I. batatas* the Rf value is noted as 0.28. Lowest Rf value is reported from an woody climber *I. alba*. In the case of plants having ovate leaves, the Rf values elymoclavine, recorded as 0.22. Elymoclavine is absent in three hairy species. (Table 1; Fig 1 and 2).The past literature records reveals that a wide range of qualitative and quantitative data of ergoline compounds in different species of morning glories. Hofmann, (1968) isolated lysergic acid and clavine alkaloids in the morning glory seeds of *I. violacea*. Genest (1966), Niwaguchi and Inoue (1969), Taber *et al*. (1963) have also identified and derived ergoline compounds from different species of *Ipomoea* in their studies.

CONCLUSIONS

In the present investigation phytochemical features such as quantity of protein, carbohydrates and ergoline alkaloids derivatives such as D- lysergic acid diethyl amide and elymoclavine were carried out. The study proved that majority of the species studied

Fig: 1

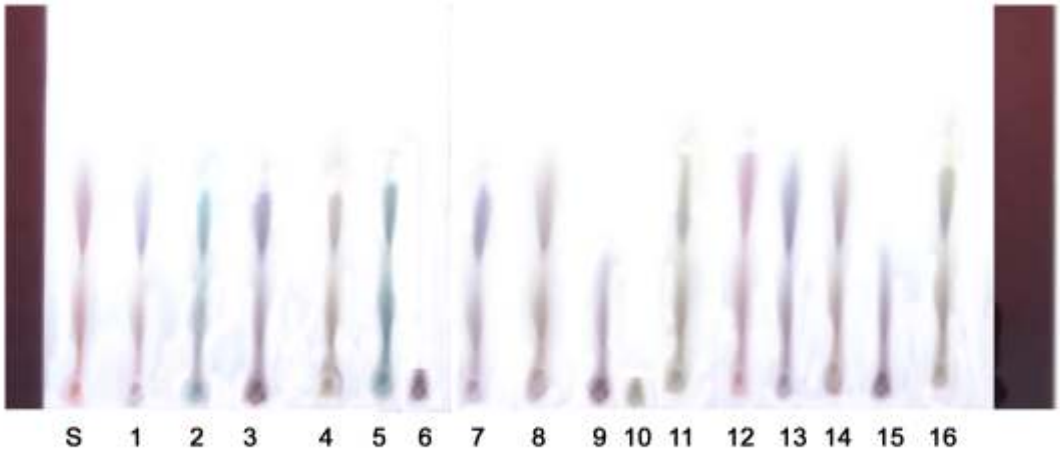
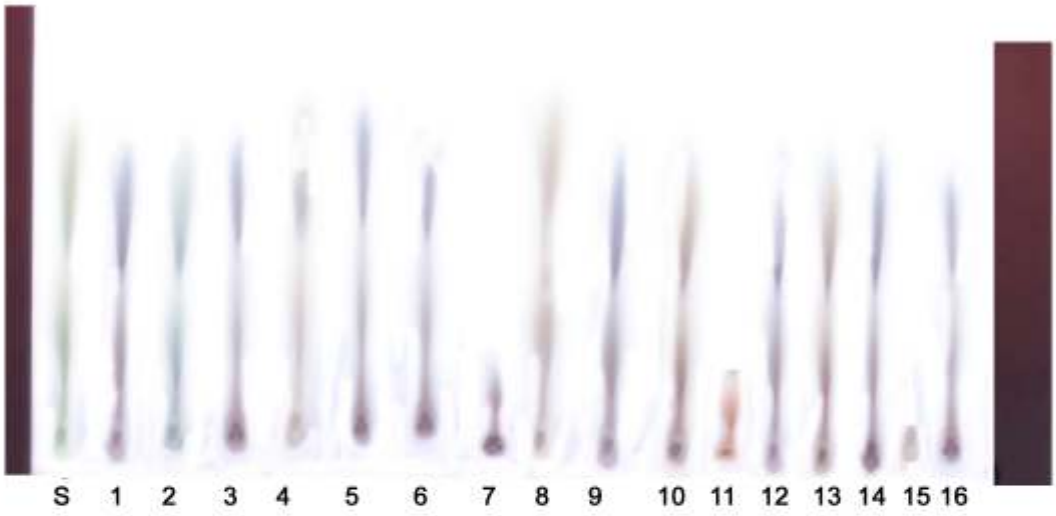


Fig: 2



Figures ***1 and 2, Thin Layer Chromatography of D- Lysergic acid and Elymoclavine***

S= Standard, 1. I. alba, 2. I. aquatica, 3. I. batatas, 4. I. cairica, 5. I. carnea ssp. fistulosa, 6. I. coptica, 7. I. digitata, 8. I. hederacea, 9. I. hederifolia, 10. I. horsfalliae, 11. I. indica, 12. I. obscura, 13. I. pes-caprae ssp. brasiliensis, 14. I. purpurea, 15. I. quamoclit, 16. I. staphylina

Table:-1 Quantitative and qualitative phytochemical results of different species of *Ipomoea*

Sl.No	Name of taxa	Protein m g/g	Carbohydrate m g/g	D- Lysergic acid diethyl amide		Elymoclavine	
				Present /absent	Rf value	Present /absent	Rf value
1	*I. alba*	0.78	0.57	+	0.26	+	0.22
2	*I. aquatica*	0.91	0.59	+	0.28	+	0.24
3	*I. batatas*	0.89	0.58	+	0.28	+	0.22
4	*I. cairica*	0.95	0.67	+	0.30	+	0.24
5	*I. carnea*, sub sp. *fistulosa*	0.99	0.69	+	0.30	+	0.22
6	*I. coptica*	0.95	0.71	-	-	+	0.24
7	*I. digitata*	1.01	0.61	+	0.28	-	-
8	*I. hederacea*	1.05	0.69	+	0.30	+	0.24
9	*I. hederifolia*	0.98	0.71	+	0.30	+	0.22
10	*I. horsfalliae*	0.98	0.65	-	-	+	0.24
11	*I. indica*	0.95	0.68	+	0.28	-	-
12	*I. obscura*	0.80	0.58	+	0.30	+	0.24
13	*I. pes-caprae* sub sp. *brasiliensis*	0.89	0.73	+	0.30	+	0.24
14	*I. purpurea*	0.88	0.83	+	0.28	+	0.24
15	*I. quamoclit*	0.86	0.77	+	0.30	-	-
16	*I. staphylina*	0.92	0.67	+	0.30	+	0.22

+ = Present, - = Absent

have high amount of protein, carbohydrate and presence of ergoline derivatives such as D-lysergic acid diethyl amide and elymoclavine. The presence of ergoline derivatives in majority of species indicates the phylogenetic resemblance and evolutionary trends in the genera *Ipomoea*.

Recommendations

Biochemical parameters are useful for identifying and classifying different plant species. Quantity of protein, carbohydrate and presence or absence of alkaloids such as D-lysergic acid diethyl amide and elymoclavine are acts as a marker of plant systematics and also helpful for cataloguing South Indian species of *Ipomoea*.

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